CCL-CP1E/B ELECTRIC VEHICLE CHARGING SYSTEM IN MODE3 SYSTEM

INSTALLATION AND USER MANUAL

V1.0

CIRCONTROL

CCL-CP1E/B MODE 3

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CIRCONTROL

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1 OVERVIEW

This user manual provides basic information about the electric vehicle charging unit: the CCL-CP1E/B MOD3, according to EN 61851-1.

Important instructions will be shown inside a box. In some cases, these will include special symbols. Their meaning is explained next:

IMPORTANT INSTRUCTION!

WARNING! DANGER! ELECTRICAL RISK!

2 SYSTEM DESCRIPTION

The CCL-CP1E/B MOD3 charge units provide to electric vehicles a plug base according to EN 61851-1.

Comparing with a simple plug CCL-CP1E/B MOD3 offers the following:

- Safe collection of energy for the installation's operator. Prevents fraud and misuse.
- Reliable measurement system for the user, since only the energy consumed is paid, with an accurate reading of the energy consumed.
- Protects end user against electrical risks. Current is only present in a non-interrupted charging cycle. The system is not powered during all other cycles.
- Current theft prevention function. The operation is interrupted if the socked is removed during the charging process, so that no more energy will be supplied to the base until the user is identified again. Ensure the power supply is stopped before the physical disconnection of the connector.
- Intelligent charging process (off-peak hours, distribution of power available, etc.) when complemented with the PC and in hourly discrimination periods.
- Let not exceed the maximum permissible current of the cable. (Insurance for the car does not have an overload, by recognizing of type of car that is connected). (MODE3)
- Dosing of the power available through a Duty Cycle. Allowing a power control that recharge point can supply, depending of the contracted power line. (MODE3)
- Reports the need for vehicle ventilation. Allows determining the battery type of the car, connected to the charging point and depending on this, and the location of the site, knowing the type of load acceptable by the vehicle. (MODE3)

The system is complemented with:

- Pre-paid cards. Available without credit (to recharge later) and pre-charged with 5, 20, 50 or 99 units of credit.
- Pre-paid card writer. There are three models available:
    - Integral model, capable of accepting credit cards and notes, CCL-Cash
    - Compact, CCL-Term
    - software version with USB peripheral, CCL-Soft

The CCL-CP1E/B MOD3 complies with the CE requirements, and the current European Union directives for this type of equipments.

The main standards that have been taken into account during the design phase are as follows:

UNE EN 62196-1: Bases, sockets, vehicle coupling devices and vehicle access points. Electric vehicle conductive charging. Part 1: Charging electrical vehicles of up to 250A in alternating current and 400A in direct current.

UNE EN 61851-1: Electric Vehicle Conductive Charging System. Part 1: General requirements.

UNE EN 61851-21: Electric Vehicle Conductive Charging System. Part 21: Requirements of the electric vehicle for its conductive connection to the main in *A.C. and D.C.*

UNE EN 61851-22: Electric Vehicle Conductive Charging System. Part 22: A.C. charging station for electric vehicles.

Other Standards: IEC61000, IEC60364-4-41, IEC60884-1, IEC61010, UNE-EN55011, ISO14443A

In accordance with these Standards, the MULTIPOINT SYSTEM has been designed for MODE1 charging system, as described in the 61851 Standard:

system with 30mA sensitivity is obligated for these systems. Vehicles cannot be charged if these systems are not installed.

This unit has been designed for outdoor use. It has an IP65 protection degree, in accordance with ANSI/IEC 60529-2004.

3 SAFETY INFORMATION

- Do not use connection cables that are not in perfect working order.
- Do not use the CCL-CP1E/B MOD3for other uses that have not been specified in its design, i.e., for any application that is unrelated to charging electric vehicles.
- Do not modify the CCL-CP1E/B MOD3 unit. In case the unit is modified, the warranty will be void and CIRCONTROL shall not be liable for any future malfunction.
- Strictly follow the current safety regulations.
- Do not repair or install elements while the unit is powered.
- Only authorised and trained personnel can access the elements powered with voltages inside the unit.
- Check the operation of the earth leakage relay periodically (at least once a month) and always after maintenance operations.
- The installation must be checked once a year by qualified personnel.
- Any unit with defects or faults that could represent a risk to the user must be removed from service (broken plugs, lids that do not close, etc.).
- Do not use spare parts that are not original of CIRCONTROL.

4 INSTALLATION

4.1 Previous verification

- Make sure that the materials have not been damaged during transport.
- Make sure that the voltage used on the board is suitable for the place/country where it will be operating.
- Make sure that the connection bases are suitable for the place/country where the unit will be operating.

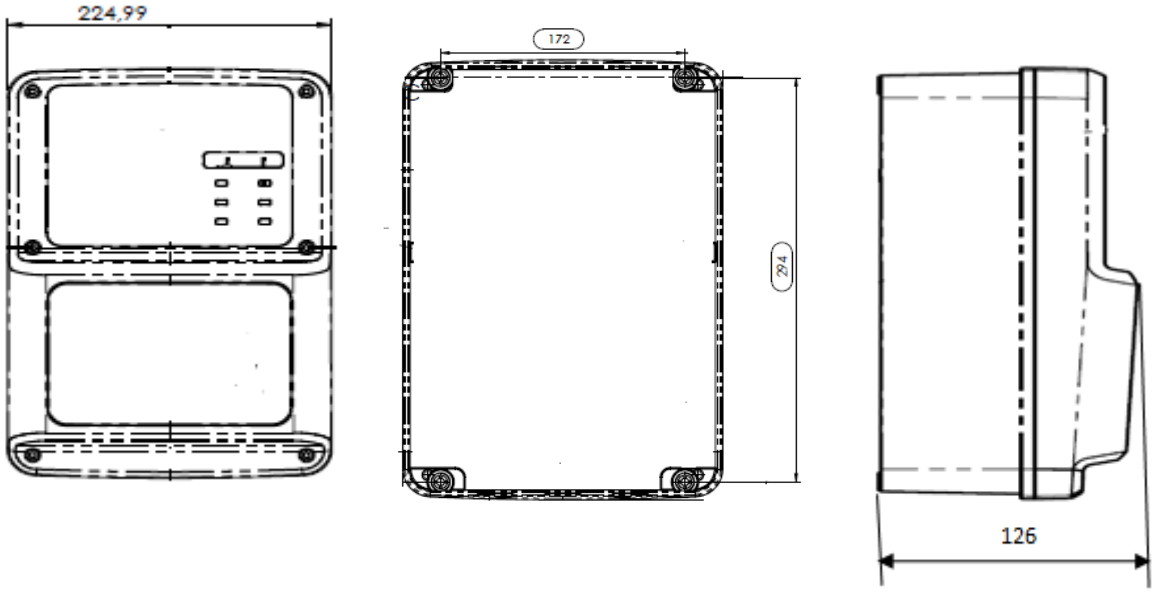
4.2 Anchoring and dimensions

The CCL-CP1E/B MOD3 is designed to be anchored to the wall and is expected to 4 points for attachment.

Not providing the anchor material as this will depend on the material where it will be anchored the box. The anchoring operation is the same as in any electrical panel in common use.

To open the box lid it has to be used the type key of screw that it was delivered to its proper maintenance and so does not cause premature degradation.

4.3 Dimensions for CCL-CP1E/B MOD3



*RFiD Receiver

*Status indicators

*MODE3 Indicators

*Type 2 connector

4.4 Electrical installation. General considerations

Qualified professionals must undertake all activities related to the electrical installation, regardless of whether a project is needed or not, depending on the power installed.

This unit has been designed for its use in a single-phase 230Va.c. and three-phase 400Va.c. with a ±10% tolerance.

> In any case, the end user must be protected against indirect contact with a residual voltage relay (DDR or differences) with a sensitivity of 30mA.

The device already includes 30mA differential protection required, so if it's necessary to protect upstream, it must be selective or time sensitivity. The choice must be made by responsible for the design of the facility, so that REBT is met and to ensure maximum system availability.

This device can not be installed in places where there is a risk of explosion (explosive atmosphere).

The minimum breaking power of the automatic header switch (circuit breaker) must be 4500A.

> The following layouts show the outline of the installation in blocks. They are shown for information purposes only. The installation company will be responsible for dimensioning the section, protection elements and lengths, in compliance with the current regulations.

Esta información es únicamente a título informativo, no aceptándose responsabilidad alguna por cualquier posible daño o perjuicio que la instalación pueda provocar. Es el instalador final quien deberá elegir (bajo su responsabilidad) la forma de instalación en función de las variables citadas, especialmente las legalmente exigibles en su país.

There is a ground terminal that must be properly wired to the conductor with the minimum section of 6mm^2. IT IS VERY IMPORTANT ITS RIGHT CONNECTION AND ITS DIMENSIONS.

The minimum section of the conductors must be 6mm^2, but that will be in function of the installation conditions (length, ducts,…) may be higher. Consult REBT or the appendices. The responsibility for the installation corresponds to the authorized installer that designs and makes.

Depending on the model, the device is able to communicate by Rs-485 compatible devices, so it will be able to send and receive commands or information.

The Rs-485 network installation must follow the requirements that the standard prescript, among others, the linear topology, end of line resistor, shielding, equipotential mass, ... Such communication can be enhanced by connecting to R-440 module or multipoint system; data can then be stored and accessed via Ethernet..

5 USER GUIDE

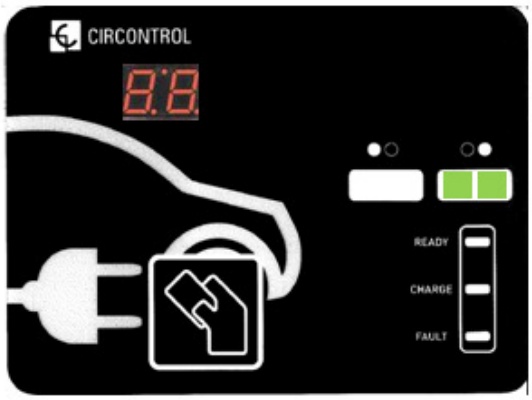
5.1 Normal charge operative

MODE 3 charging station have three diferent leds indicators GREEN, ORANGE and RED for indicate estate of equipment.

- Ready: Indicates system is ready for charge.
- Charge: Indicates system is charging .
- Fault: Indicates system has found one problem.

5.1.1 Charge operation for Models with RFID reader and display CCL-CP1E MOD3.

1.Once unit get Power supply, verify unit is ready.

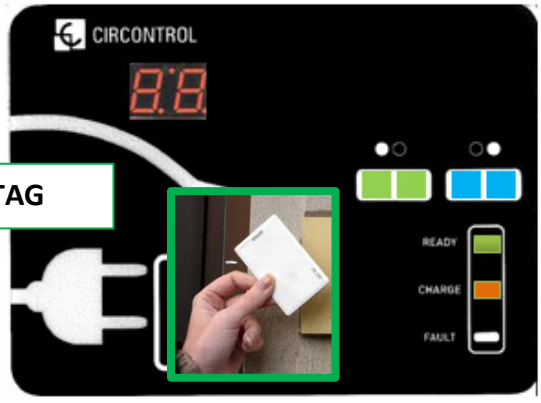


1. Green indicator lights in the marker.

Unit is ready for charging.

2. Connect the electric vehicle with Type 2 connector to the unit.

3. Approach RFID TAG to the unit for charge **START.**



RFID TAG

1. Display will indicates remaining credits inside Tag.

2. CHARGE indicator lights and LCD display starts to roll.

Do not unplug connector from Vehicle till not stop the charge approaching TAG to the unit.

4.Show RFID Tag to the unit for STOP charge.

5. Now you can unplug electric vehicle.

5.1.2 End of charge cycle. (Normal end)

1. Present the RFID card to the reader.
2. Cycle is interrupted.
3. Disconnect the charge.
4. The credit not consumed is retrieved to the card. “00”
5. Displays the credit. “00”
6. Remove the card.

5.1.3 End of charge cycle (end of credit)

1. If it’s displayed “o” stopped, indicate
cycle.
Digit 1, channel one NO active. Digit 2, channel two NO active.
2. Present the RFID card to the reader.
3. Disconnect the charge.
4. The credit is retrieved to the card. “xx”
5. Displays the credit. “xx”

6. Remove the card.

The following explanation refers to loans used but as a symbol €.

In countries where the currency has a similar magnitude to the EURO (€) can be considered as 1 € or 1 credit.

In countries where the currency is very different order of magnitude to the EURO (€), a conversion can be easily calculated, which for example is 1 credit = 1000 local units. In that case, speaking of credit makes more sense.

5.1.2 Start of charge cycle

1. Present the RFID card to the reader.
2. After a while displays the credit value.
3. If the claim is correct, a deposit is deducted from the card and transferred to the charge.
4. Select the charging shocked
5. Connect the charge.
6. Remove the card.
7. The system connects the power and starts the control of credit as the energy consumed.
8. The display shows a segment simulating a twisting motion with a speed proportional to power output.

5.1.3 End of charge cycle (Normal end)

1. Present the RFID card to the reader.
2. Cycle is interrupted.
3. Disconnect the charge.
4. The credit not consumed is retrieved to the card. “xx”€
5. Displays the credit. “xx”€
6. Remove the card.

5.1.4 End of charge cycle (end of credit)

1. If it’s displayed “o” stopped, indicate that the system has stopped the charging cycle.

   Digit 1, channel one NO active. Digit 2, channel two NO active.
2. Present the RFID card to the reader.
3. Disconnect the charge.
4. The credit is retrieved to the card. “00”€
5. Displays the credit. “00”€.
6. Remove the card.

5.1.5 End of charge cycle (missing charge end)

1. In display “0”, indicates system has stop charging system .

   Digit 1, channel one NOT active. Digit two, channel two NOT active.

2. Present RFID to reader.
3. Unplug connectors for charge.
4. Remnant credit of the unit is returned to the card. “xx”€.
5. Display shows crédit. “xx”€.
6. Remove tag.

This Stop mode only can happens after one minute from charge start, if not power consumption has occurred.

5.2 Retrieve credit operative

(Following Interruption of the charging cycle through no fault of the user)

After the interruption outside the client, when it returns to recover the debt, it is available, whether or not in use the unit for another client, the following operations:

5.2.1 Previous cycle interrupted card

1. Present the RFID card to the reader.
2. The system looks for the target on to the “TAG” code buffer.
3. Once found retrieves the value of credit that user had before the cycle was interrupted.
4. Once you update the card, the display shows "rC.
5. Remove the card.
6. The reader unsubscribes in the buffer the "TAG" code of the card.

Once retrieved the credit the card is ready for a new charge cycle.

5.3 Missing credit operative

5.3.1 Start of charge cycle

1. Present the RFID card to the reader.
2. After a while it displays the credit value.
3. If the credit is not correct, the display show “00”€ during 2s and doesn’t start any new cycle.
4. Remove the card.

5.3.2 Display indications

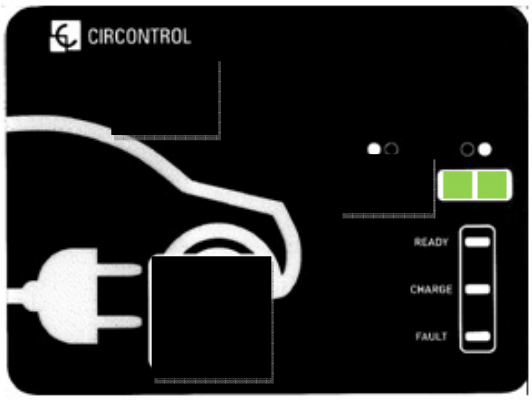
“rC” – Credit retrieve.
“Ex” – Error x.

“ . ” – Channel indication that it is on resting time. (During this time there is no reading card for this channel.

“O” – The output is on charge cycle if oscillates vertically. Stationary cycle, while standing.

5.4 Charge operation for Model without RFID reader CCL-CP1EB MOD3.

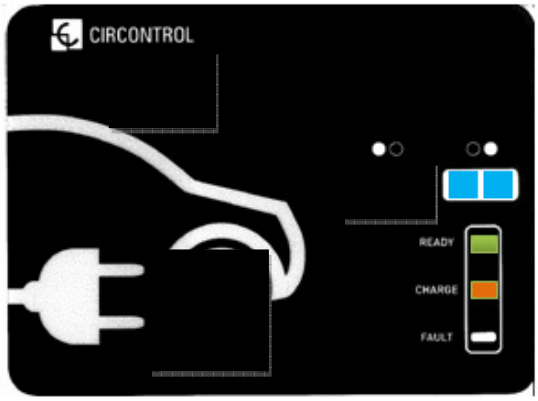
1. Once unit is powered , please verify unit is ready to work.



1. Green indicator lights in the marker.

Unit is ready for charging.

2. Plug connector Type 2 to the unit and connect other side to Electrical Vehicle



1. Unit will start with safety communications between car and unit.

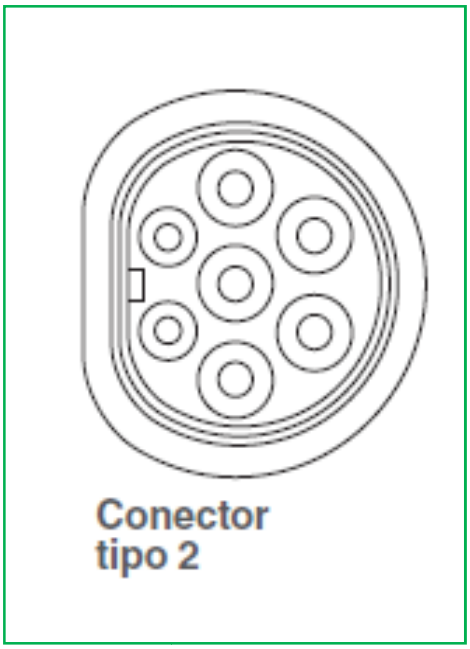
2. CHARGE indicator lights, charge starts.

Stop charge mode unplugging Type 2 connector from the unit.

6.1 General Description

The vehicles charge system CCL-CP1E/B MOD3 is an electrical and mechanical set able to offer charge service safely both indoors and public places and hold a continuous use recharge service.

- CCL-CP1E/B MOD3, one type 2 output parking box with communication.



6.2 Disassembly

To get access inside the CCL-CP1E/B charger is necessary to open the back lid, depending on model, with Allen screws.

NOTE: Must use Allen wrench to screw supplied appliances for proper maintenance and do not cause premature degradation.

Once CCL-CP2 is opened the electrical devices are able to be manipulated and the guidance system hat.

To continue with the removal, follow the following sequence:

1. Disconnect the power supply before disconnect electrical intervention. Only trained personnel are authorized, and with the precautions and appropriate personal protective equipment.
2. If it's not possibly to take the whole power supply, for example because there are others posts on charge, disconnect the power supply from local area through de RCCB.
3. ATENTION WITH THE DISCONNECTION PROCESS!

a. Press the test button. This test will show if the RCCB works correctly (sensibility). Is recommended to do in each intervention.
b. If the RCCB has not jumped, stop until the fault has been repaired by trained personnel. Remember that the test button does not work if the residual circuit breaker is not powered.
c. Remember that the RCCB input terminals can be powered so it has to be careful to avoid manipulation closer it. Do not do any operation if there are faulty cables, insulation damage or vulnerability of any party liable to be powered.

4. Disconnect the ground cable.

6.3 Assembling

1. Carry out the same steps in reverse order of removal.
2. DO NOT FORGET THE GROUND CABLE RECONNECTION.
3. To proceed to testing RCCB should be reconnected again
4. ATTENTION WITH THE RCCB CONNECTION PROCESS!

   a. If the power supply was cut upstream, supply the devices to test the RCCB. If it is not possible to supply it just raise the handle to rearm the RCCB.
   b. If long time passed between the disconnection operations RCCB, should do the sensitivity test again as indicated in the previous section. Proceed to press the test button.
   c. If keeps not running, treat the incident as a failure, with the protocol established by those.

5. Replace the lid and set it correctly.

6.4 Preventive maintenance

The recommended preventive maintenance and his frequency is the following:

6.4.1 MONTHLY:

- Sensibility test.

  Make sure that the RCCB works correctly. We recommend test it causing a current leakage in one plug (is not necessary to test it on both).

6.4.2 YEARLY:

REMEMBER TO REMOVE POWER!

- Do the monthly RCCB preventive maintenance.
- Check the electrical wiring is correctly, there are no obvious faults in the insulation or defects on the components.
- Check the proper tightening of the screws on the power components, especially the RCCB (if it's provided) and circuit breakers to which access is provided. Use the right tool on each case.
- General cleaning on the electrical components area and the lower hat area. Remove with a brush the dust. Clean inside the card reader with the brush or o tissue.
- Check the connection state base is correct.

6.5 Corrective maintenance

6.5.1 Problems – Causes – *Solutions*

- METERING CURRENT PROBLEMS

    - If no credits discounts despite consumption. Then the toroidal transformer is probably assembled incorrectly. *Solution: Check and correct if necessary.*

    It could be problems with the corresponding card energy control (the main or auxiliary). If it is appropriate replace it, remember that it must also replace the corresponding toroidal transformer. Attention to assembling the toroidal transformer because it has polarity. The ground wire must pass the toroidal brown side.

    It is also important whatever the type of electronic card to replace, to verify that the original bridges have inserted, and reproduce in the spare card. Do not replace any card under supply or with a different type.

    - If there is no reaction when the card is inserted, probably it not recognizes the card or it is empty.

- COMUNICATION PROBLEMS (COM)

The communication follows always the same order:

X2 communicates with R-440. R-440 communicates with modem. Modem communicates with the network. Obviously the posts which don't have R-440 or modem do not apply to them what is said.

- Behind a communication interruption check as the following order, depending with the material that the CCL-CP2 incorporates:

    - The COM led of the X2 card Works correctly (see on electrical wirings peg.). The communication with R-440 works when is flashing.
    - When the R-440 communicates with the X2, the led Tx and Rx are flashing.
    - I case that doesn't work, check the twisted cable Rs-485 has reliability and is will connected.

      Terminal A = (+), Terminal B =(-)

    - Check the R-440 configuration is charged correctly. It is necessary to know the PowerStudio and connect by modem or Ethernet cable (inverted).

- OTHER PROBLEMS

    - If there is nothing displayed when a valid card is introduced probably there is no voltage. The REC2 jumped or the power supply has been interrupted upstream.
    - When charge is requires and there is a rC on the display it is not a real problem. The charge does not start because the card is recovering the credit. That credit was saved because the previous load that card ended incidents.

6.6 Spared parts and recommended tools

The required tools to perform proper preventive or corrective maintenance are the normal installation electrician. The PPE (Personal Protective Equipment) are also common, and should be designed by the Prevention Service employee responsible who makes the assistance.

The following mentioned tools are the only not commonly used:

- Flat brush with long hair.

The amount and type of recommended spare parts are described in the following list:

- Main card control. If this card is replaced, also replace the toroidal. The spare card brings its own toroidal. We recommend having 1 unit per 10 CCL-CP1E/B.
- Auxiliary card. If it is replaced, also replace his toroidal. The spare card brings its own toroidal. We recommend having 1 unit per 10 CCL-CP1E/B.
- Auxiliary MODE3 card. We recommend having 1 unit per 10 CCL-CP1E/B.
- Plug bases. We recommend having 2 units per 10 CCL-CP1E/B.
- RBC. Check the sensibility of the RCCB is 30mA. (=0,030A). We recommend having 1 unit per 10 CCL-CP1E/B.
- Power relay. We recommend having 2 units per 10 CCL-CP1E/B.
- Overcurrent protector. We recommend having 2 units per 10 CCL-CP1E/B
- Allen screws of the lid. We recommend having 30 units per 10 CCL-CP1E/B.

6.7 Auto-diagnostic. Display code

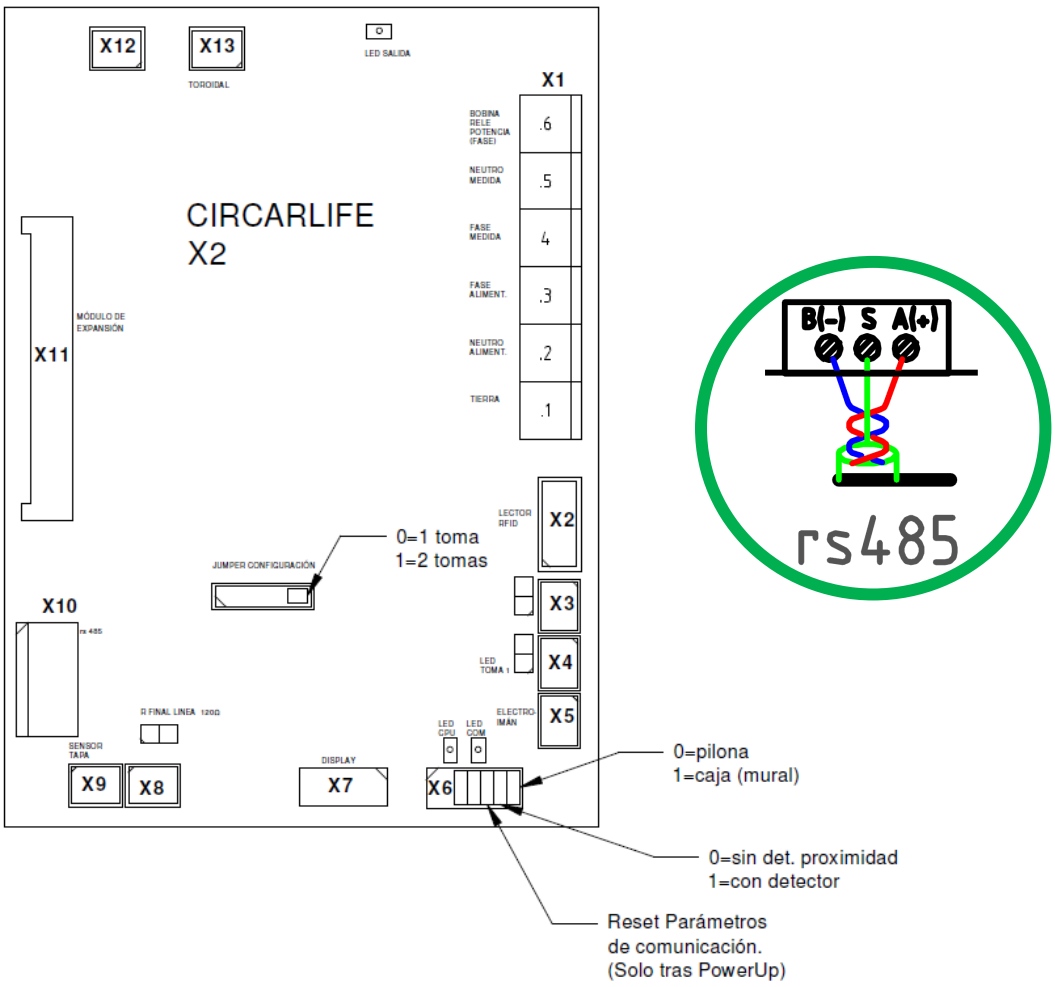
2 9	Software version is displayed for 1 second after unit is connected to the electrical supply
8 8	Indicates credit avalible when the RFID card is presented to the card reader. Example '88'
9 9	When the credit number is flashing '99' this indicates that the credit value is greater than 99
L	Socket 1. Allows charging regardless of avaliable credit. This option only works with a suitably formatted card and the correct software upgrade in the charging equipment
L	Socket 2. Allows charging regardless of avaliable credit. This option only works with a suitably formatted card and the correct software upgrade in the charging equipment
H	Socket 1. 'H' indicates that the charging unit has reached the preset time limit. This feature can be enabled or disabled by the factory using the charging equipment software
H	Socket 2. 'H' indicates that the charging unit has reached the preset time limit. This feature can be enabled or disabled by the factory using the charging equipment software
0	Socket 1. '0' flashing indicates the charging unit has reached the preset time allowed for a minimum charge
0	Socket 2. '0' flashing indicates the charging unit has reached the preset time allowed for a minimum charge
.	It draws a card of the channel 1, properly updated or insert a card that is not correct
.	It draws a card of the channel 2, properly updated or insert a card that is not correct
-	Socket 1. A segment fixed in one position indicates there is no load. When the segment is rotating it indicates charging. The speed of the rotation indicates the amount of load
-	Socket 2. A segment fixed in one position indicates there is no load. When the segment is rotating it indicates charging. The speed of the rotation indicates the amount of load
r C	Credit recovery failed in a previous cycle. Reset the system
E 1	Communication failed with RFID card reader
E 2	RFID Reader unable to read card
E 3	*Not Used*
E 4	RFID Reader unable to write to card

The information that appears briefly in the card reader display shows the firmware version number, i.e. 29 is version 2.9.

Errors "E1, E2, E4" have automatic recovery.

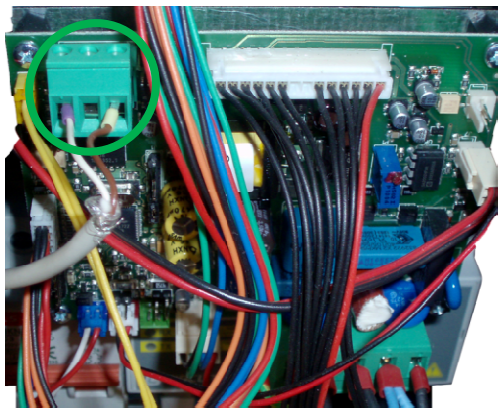
6.8 Electrical wiring

- X2 Card. Topographic distribution.



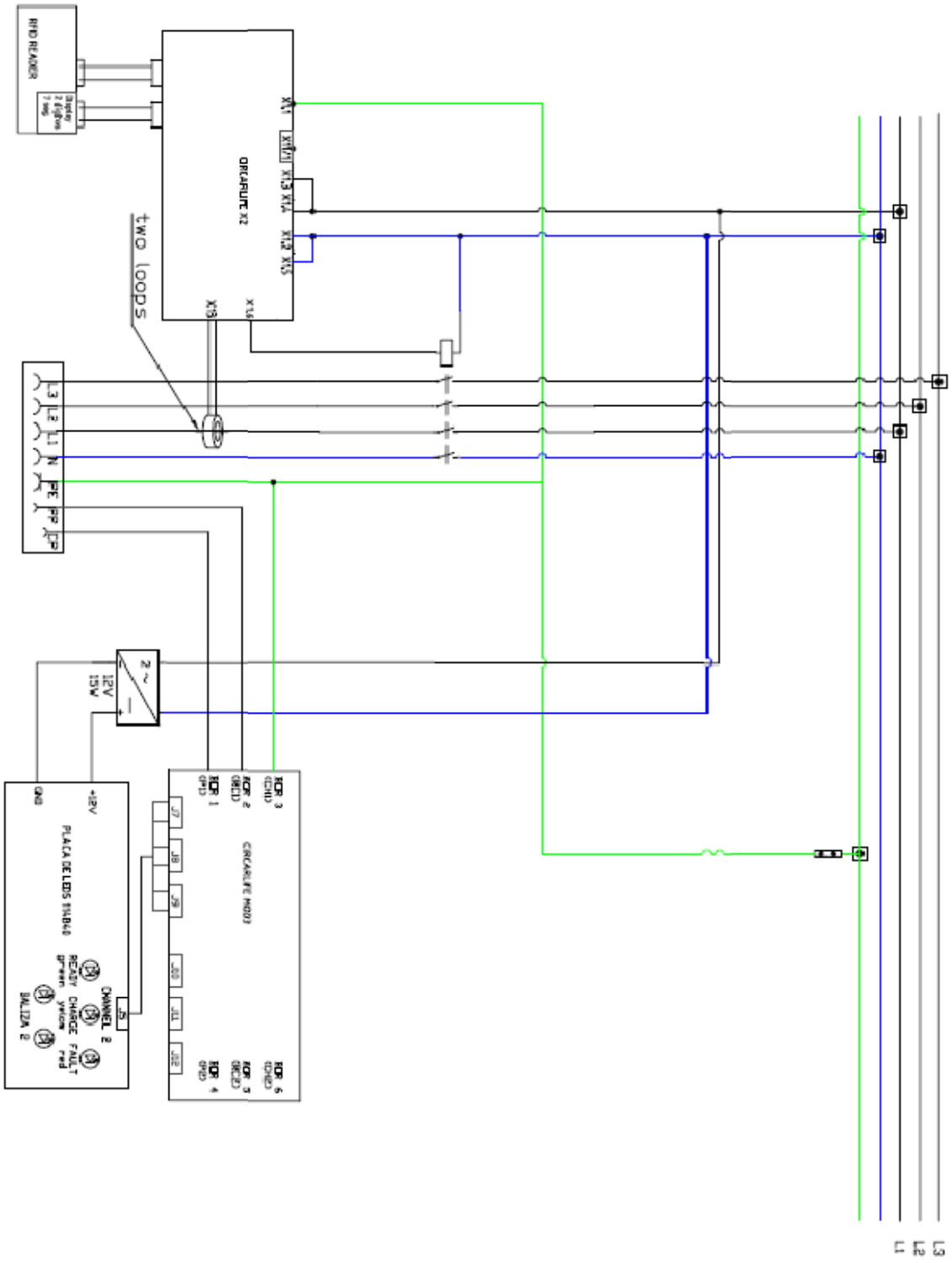
1. Rs-485 twisted cable connection:

Terminal A (brown) = (+)
Terminal B (white) = (-)



Rs-485 TACHNICAL CHARACTERISTICS	
Speed	57600bps
Default address	A98
Default nº of nodes	98
Stop bit	8n1

The number of nodes must be changed when it is integrated into a network by factory default is set at 98, the same goes for the direction of the Rs-485.


RFID READER
CIRCARLIFE X2
two loops
L3
L2
L1
N
PE
PP
CP
12V
15W
PLACA DE LEDS 11HB40
+12V
GND
CHANNEL 2
READY green
CHARGE yellow
FAULT red
BALIZA 2
CIRCARLIFE H6003
L1
L2
L3

6.9 Connection configuration.

1. Connect the input connection in monophasic or Threefasic configuration to contactor, please be careful with phases L1,L2,L3,neutral as show the figure.

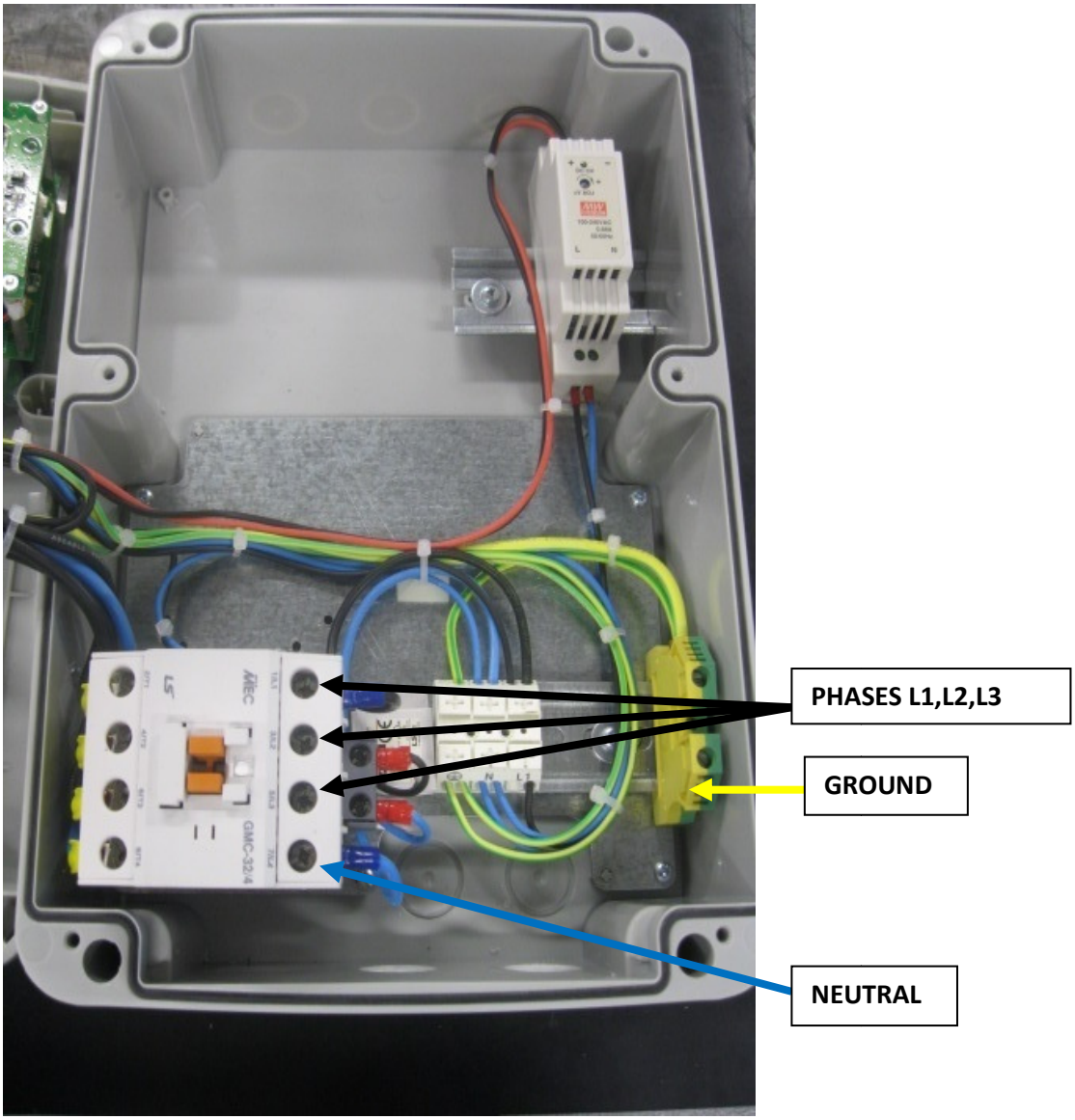
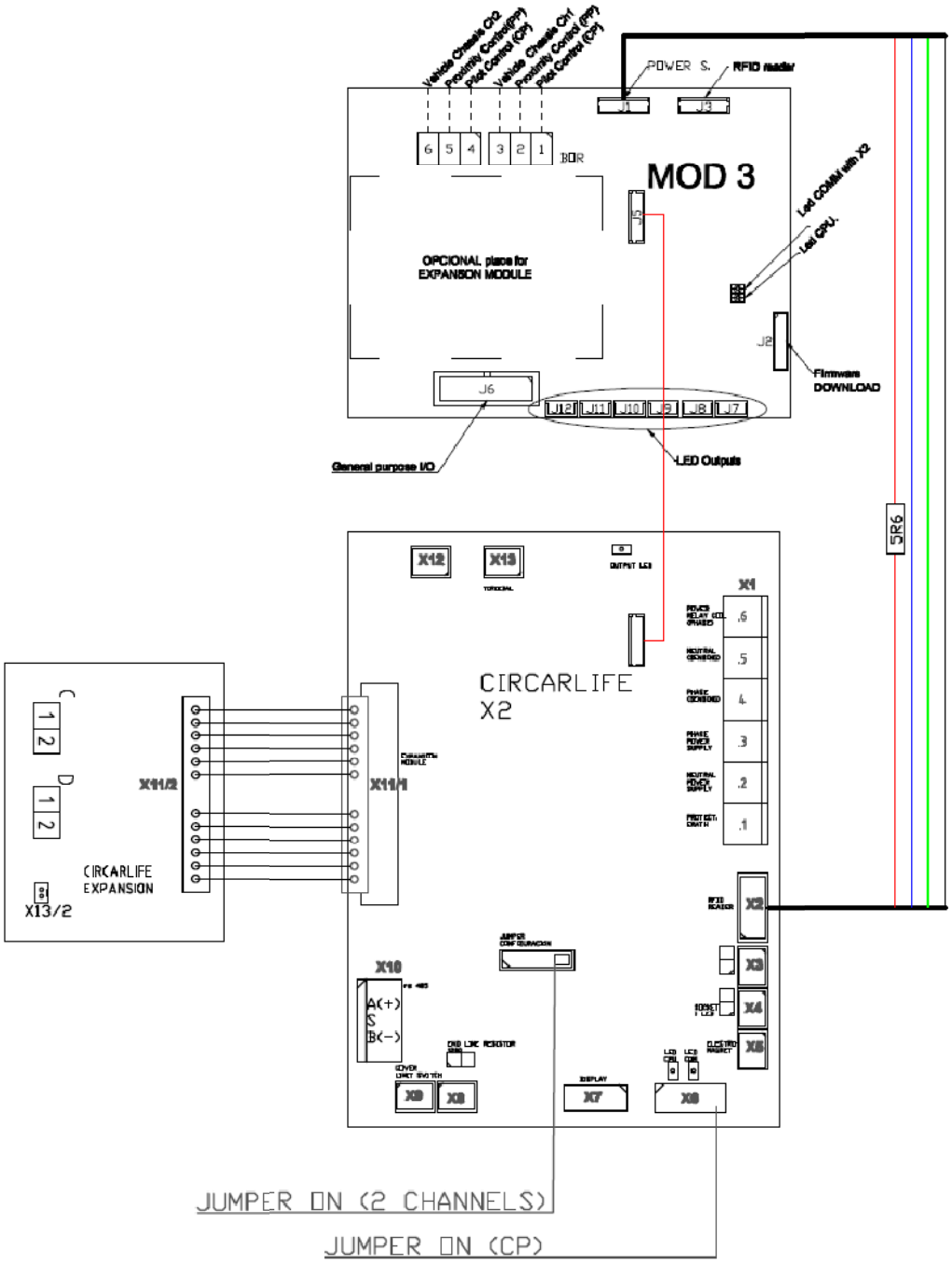


Figure 1. Threephase connection detail for CCL-CP1EB MOD3

X2+MODE3 cards for MODE3. Topographic distribution.



7 TECHNICAL DATA

Rate input frequency	50… 60 Hz
Output Voltage	= Input voltage
Power meter	Internal meter
RFID Reader	ISO 14443A
Range Temperature	-10… 60 °C
Protection IP	IP65
Envelope	ABS
Input Voltage	230V/400Vc.a. L+N+PE ±10 %
Maximun current	32A
Maximun consumption	7,2kW
Mode3 connector	Type 2
Dimensions	320mm; 225mm; 125mm
Weight	3Kg

8 APPENDIX

8.1 Recommended section cable

Tabla 1. Intensidades admisibles (A) al aire 40 °C. N.º de conductores con carga y naturaleza del aislamiento

A		Conductores aislados en tubos empotrados en paredes aislantes		3x PVC	2x PVC		3x XLPE o EPR	2x XLPE o EPR					
A2		Cables multiconductores en tubos empotrados en paredes aislantes	3x PVC	2x PVC		3x XLPE o EPR	2x XLPE o EPR						
B		Conductores aislados en tubos[2] en montaje superficial o empotrados en obra				3x PVC	2x PVC			3x XLPE o EPR	2x XLPE o EPR		
B2		Cables multiconductores en tubos[2] en montaje superficial o empotrados en obra			3x PVC	2x PVC		3x XLPE o EPR		2x XLPE o EPR			
C		Cables multiconductores directamente sobre la pared[3]					3x PVC	2x PVC		3x XLPE o EPR	2x XLPE o EPR		
E		Cables multiconductores al aire libre[4]. Distancia a la pared no inferior a 0,3 D[5]						3x PVC		2x PVC	3x XLPE o EPR	2x XLPE o EPR	
F		Cables unipolares en contacto mutuo[4]. Distancia a la pared no inferior a D[5]							3x PVC			3x XLPE o EPR[1]	
G		Cables unipolares separados mínimo D[5]									3x PVC[1]		3x XLPE o EPR
		mm²	1	2	3	4	5	6	7	8	9	10	11
Cobre		1,5	11	11,5	13	13,5	15	16	—	18	21	24	—
		2,5	15	16	17,5	18,5	21	22	—	25	29	33	—
		4	20	21	23	24	27	30	—	34	38	45	—
		6	25	27	30	32	36	37	—	44	49	57	—
		10	34	37	40	44	50	52	—	60	68	76	—
		16	45	49	54	59	66	70	—	80	91	105	—
		25	59	64	70	77	84	88	96	106	116	123	166
		35		77	86	96	104	110	119	131	144	154	206
		50		94	103	117	125	133	145	159	175	188	250
		70				149	160	171	188	202	224	244	321
		95				180	194	207	230	245	271	296	391
		120				208	225	240	267	284	314	348	455
		150				236	260	278	310	338	363	404	525
		185				268	297	317	354	386	415	464	601
		240				315	350	374	419	455	490	552	711
		300				360	404	423	484	524	565	640	821

[1] A partir de 25 mm2 de sección.
[2] Incluyendo canales para instalaciones —canaletas— y conductos de sección no circular.
[3] O en bandeja no perforada.
[4] O en bandeja perforada.
[5] D es el diámetro del cable.

9 ASOCIATIONS

Our group belongs to and is actively involved in various committees on the Electric Vehicle:

• CHAdeMO Association (International Association works for the standardization of charging stations for electric vehicles). Certified members.

• ASESGA (Spanish Association of Car Parks and Garages). Technology Committee.

• AFME (Association of Electrical Manufacturers). Electric Vehicle Working Group.

• CEEC (Cluster Energy Efficiency Catalunya). Electric Mobility Group.

• AMEC URBIS (Spanish Association of Urban Equipment and Traffic). Electric Vehicle Commission.

• Forever (Spanish Forum Electric Vehicle).

• AEDIVE (Association of Business Innovative Electric Vehicle Infrastructure).